

Similar Triangles

When two triangles have the same angles but different magnitude they are similar.

⇒ This means that: corresponding angles are equal and the pairs of corresponding sides are proportional.

The symbol \sim means "is similar to".

$\Delta ABC \sim \Delta DEF$ **Order of letters matters!

$$\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$$

$$\frac{3}{6} \sim \frac{2}{4} \sim \frac{4}{8}$$

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Conditions for Similarity

1) **SSS** Side - Side - Side

If three sides of corresponding triangles are proportional, then the triangles are similar.

2) **SAS** Side - angle - side

If two lengths of corresponding sides are proportional and the contained angles are equal, then the triangles are similar.

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3) **AA** angle - angle

If two magnitudes of corresponding angles are equal, then the triangles are similar.

$\Delta NPQ \sim \Delta RST$ OR $\Delta NPQ \sim \Delta RST$

Write the "proportion statement":

$\therefore \Delta NPQ \sim \Delta RST$ because (AA)

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Example 1)

A metre stick casts a shadow of 1.6 m. At the same time, a tree casts a shadow of 18.1 m. How tall is the tree to the nearest tenth of a metre?

Diagram:

ALWAYS START WITH SIMILARITY STATEMENT IF IT IS NOT GIVEN.
THEN, WRITE PROPORTION STATEMENT.

$\Delta ABC \sim \Delta DEF$ (AA)

$$\frac{BC}{EF} = \frac{AB}{DE}$$

$$\frac{1.6}{18.1} = \frac{1}{x}$$

$$1.6x = 18.1$$

$$x = 11.3$$

The tree is 11.3 m tall.

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Example 2) Solve for x.

$\Delta ABC \sim \Delta ADE$ (AA)

Need: Similarity Statement

Need: Proportion Statement

$$\frac{AE}{AC} = \frac{AD}{AB}$$

$$\frac{16.8}{30} = \frac{18}{x}$$

$$16.8x = 540$$

$$x = 32.1$$

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Example 3) In the diagram below, $\Delta ABC \sim \Delta DEF$

a) Write the proportion statement:

$$\frac{AD}{DE} \sim \frac{BC}{EF} \sim \frac{AC}{DF}$$

b) What is the "scale factor"?

$$\frac{3}{9} = \frac{1}{3}$$

c) Calculate the perimeter of each triangle.

d) Calculate the area of each triangle.

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